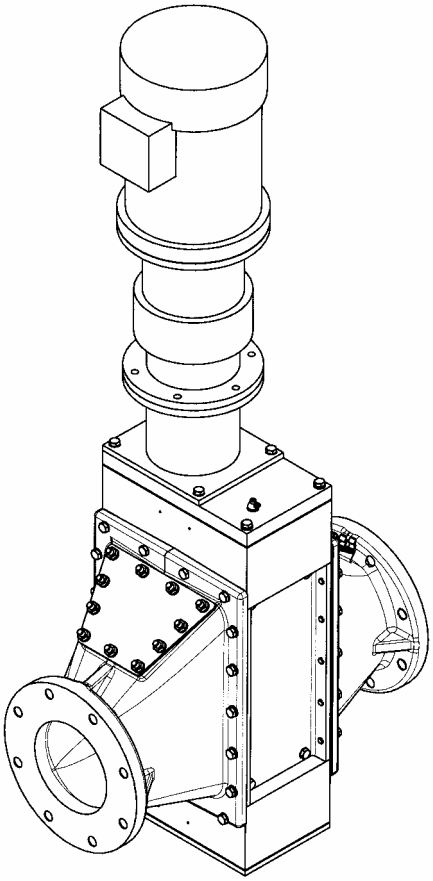
SERVICE MANUAL

# MOYNO®

## Annihilator™ Series 2



MOYNO

*Always the Right Solution™*

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# SERVICE MANUAL
# Moyno® Annihilator™
## Series 2

## 1-1. INTRODUCTION

### 1-2. GENERAL

The Moyno® Annihilator, twin shaft grinder, is a rugged and reliable grinder designed to efficiently reduce the size of large solids typically encountered in raw wastewater, primary thickened sludge, digested sludge, slaughterhouse waste, and pulp and paper recycling. The grinder has been tested to assure consistent performance in the most difficult of applications. It represents the next generation of the world's most reliable grinder.

The Moyno® twin Annihilator utilizes an improved version of the counter-rotating shaft design that has proven to be a reliable method of shredding large solids (pieces of wood, plastic bottles, cloth towels and rags, and aluminum cans, etc.) into smaller pieces. The slow rotating shafts are ideal for shredding solids that are large and dense. By utilizing a slow speed gear motor, the cutters have high torque capability and low impact while severing debris.

The Moyno Annihilator is designed with cutting teeth on both the cutters and spacer cutters which increases the cutting capability of rags over other twin shaft grinders and eliminates the greatest cause of failure – that of stringy material wrapping around the spacers.

The Moyno Annihilator product line is modular in concept allowing for optimal utilization of cutters for channel or in-line units to meet the requirements of the application. The cutter cartridge assembly allows for the removal and replacement of the entire cutting assembly as a single unit. The cutter cartridges consist of a top and bottom housing, side rails, bearing/seal cartridges, hex shafts, cutters, and spacer cutters (Figure 1-1.).

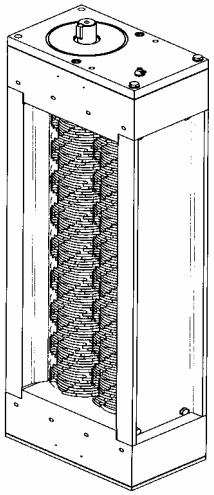

Figure 1-1. Cutter cartridge.

The complete Annihilator unit consists of the cutter cartridge assembly, reducer adapter, gearbox, motor, and flange housings on in-line units (Figure 1-2).

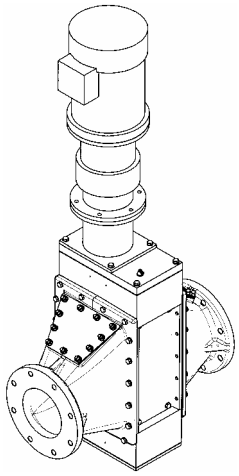

Figure 1-2. Complete unit.

### 1-3. NAMEPLATE DATA

The grinder nameplate, located on the top housing, contains important information relating to the operation and servicing of the grinder. This information includes the model and serial numbers (see Figure 1-3.). The grinder model number must be used for reference when ordering a replacement cartridge or spare parts.

| | |
|---|---|
| Model: | M12F2 CE7R7R |
| MFG Serial: | ASXXXXXX |
| Date: | 10/04 |

Figure 1-3. Typical nameplate data

**1-4. Model Number.** The grinder model number consists of two component parts: Frame Designation and a Trim Code. A typical model number, for example, might be M12F2 CE7R7R as shown on the nameplate in Figure 1-3.

**1-5. Frame Designation.** The five characters in the frame designation describe the particular combination of construction and cutter height.

The first character in the frame designation, always a letter, indicates the construction as either a complete unit (M) or replacement cartridge (C).

The second and third characters, always numbers, indicate either the flange size or cutter stack height.

The fourth character is a letter indicating whether it's a flange unit (F) or channel unit (C). If the fourth character indicates a flange unit, the second and third characters indicate the flange size in inches. If the fourth character indicates a channel unit, the second and third characters indicate the cutter stack height.

The fifth character indicates the series of the unit:
Series 2 -- 2½" hex shaft
Series 3 – 2" hex shaft, design after July 2003
Series 4 – 2" hex shaft, one-piece flange housing design

**1-6. Trim Code.** Also included in the Model Number is the six character Trim Code which is used to identify grinder construction.

The first letter identifies the materials of construction.
C -- Cast iron, ductile iron, and alloy steel
S -- Stainless steel
X -- Special

The second letter identifies the type of drive utilized.
E -- Electric motor and gear box
S -- Submergible motor and gear box
H -- Hydraulic motor with power package
X -- Special

The third and fourth characters identify the type of cutters on the drive shaft:
5R – 5 tooth reversible
7R – 7 tooth reversible
7C – 7 tooth cam
11C – 11 tooth cam

The fifth and sixth characters identify the type of cutters on the idler shaft:
5R – 5 tooth reversible
7R – 7 tooth reversible
7C – 7 tooth cam
11C – 11 tooth cam

If the trim code of your grinder is other than the variations listed above contact your nearest Moyno representative for clarification. Do not modify your grinder with any variations unless you have determined that it is compatible with your application.

**1-7 EQUIPMENT DESCRIPTION**

**1-8. Grinder Unit.** The Moyno Annihilator is a motor driven, double shaft design stacked with intermeshing cutters and spacer cutters positioned on the shafts. The shafts are constructed of a hexagonal, 4140 steel and counter-rotate at 43 and 26 RPM. The shafts contain intermeshing cutters and spacer cutters.

The Moyno Annihilator Series 2 product line, consist of three channel models with 18, 24 or 32 inch high cutting chamber, and three flanged, in-line models: 12, 16 or 18 inch flanged.

**1-9. Motor.** Each Moyno Annihilator is equipped with a motor:
- TEFC or Explosion proof design
- 10 HP
- 1725 RPM, 3/60/230/460V
- Baldor or Moyno choice

**1-10. Reducer.** Each Moyno Annihilator is equipped with a cycloidal speed reducer:
- 40:1 ratio
- 43 RPM output
- Sumitomo or Moyno choice
- Model 6170Y… 10 HP

Note: See manufacturer's service manuals for more details.

# 2-1. INSTALLATION

**2-2. GENERAL**

Moyno Annihilators are lubricated and tested at the factory prior to shipment and require minimum pre-start up maintenance.

Accessibility to the grinder and adequate clearance should be a prime consideration in any installation. Enough space should surround the unit so that maintenance can be carried out with ease.

**2-3. Piping.** For in-line flanged units, piping should generally be the same size as the flange and supported, not applying vertical or horizontal forces to the grinder flanges. **Be sure to mount the unit in the piping in the proper flow direction. Check the flow direction arrow on the grinder.**

**2-4. FOUNDATION**

Flanged units should be mounted on a concrete base. The base should be 4-8 inches wider then the Grinder base. Anchor bolts are not required to attach the grinder to the concrete base.

Check the base surface with a carpenter's level and shim under the grinder at the places necessary to make the unit level. Care should be exercised to ensure the grinder flanges are mounted in line and without piping strain.

Channel units should be mounted in a suitable framework for support.

**2-5. Motor Controls.** To protect the Moyno Annihilator from potential damage, all Grinder units should be wired to a Moyno control panel. In the event an unusually difficult material engage the cutting chamber, the automatic controller senses the overload and reverses the rotation of the cutters to clear the object. The controller then returns the Grinder to the forward direction of rotation. It is highly recommended that this type of overload protection be provided for all grinders to prevent damage to the unit.

**Caution:**
- **Cutters and spacer cutters are very sharp. Keep personnel clear of cutting chamber.**
- **Do not lift heavy equipment over the head of personnel.**
- **Electrical hazard…Be sure power is off and locked out.**

## 3-1. OPERATION

### 3-2. INITIAL CHECK / START-UP CHECKLIST

Before putting the grinder into operation, the following items should be checked to ensure that each piece of equipment is installed correctly:

- Recheck for proper line voltage connections at the control panel and control transformer. Check the transformer for continuity.
- Set the programmed controller (inside the door of the Annihilator control panel) to the number of attempts desired to clear jams or overloads before automatic shutdown. The programmed controller is normally set at 3 reversals when shipped from the factory.
- Energize the incoming power lines by closing the disconnect device. The amber light ["POWER ON"] illuminates, indicating power is available to the control circuitry.
- Turn the Selector Switch to the "LOCAL" position. Depress the "Start" pushbutton. The blue light ["GRINDER ENABLED"] will illuminate to indicate that the control circuits are energized and the green light ["GRINDER RUNNING"] will illuminate indicating the drive motor should be operating.
- Check the direction of cutter rotation.

**Reversible cutters** denoted as 5R or 7R, can operate in either direction of rotation. The cutters should rotate with the teeth rotating inward, towards one another on the inlet side of the flow. If the motor is rotating in the reverse direction, disconnect the power to the control panel.

***CAUTION: Using a volt meter double-check that the incoming power lines L1, L2, and L3, as well as the motor lines T1, T2, and T3 in the control panel all indicate that the power is OFF.***

Interchange any two of the motor leads in the control panel at Terminal Blocks T1, T2, or T3. Do not change the connections at the contactors. Repeat Steps 3, 4, and 5, above.

However, **cam cutters** denoted as 7C or 11C, can only operate in one direction of rotation. The cutters should also rotate with the teeth rotating inward, towards one another on the inlet side of the flow. With cam cutters you must first install the unit in the piping in the correct flow orientation. Interchange motor leads if the cutter direction is wrong.

- To test the reversing function of the programmed controller, it is not necessary to attempt to physically jam the grinder. Simply depress the "Test" button on the controller inside the door of the panel. Each activation of the "Test" pushbutton will initiate a reversal of the grinder.

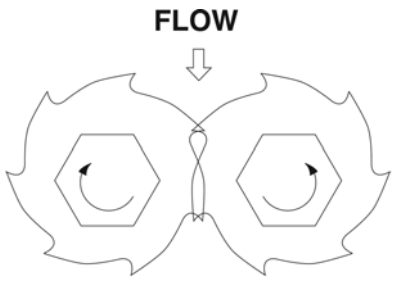


Figure 3-1. Cutters rotating inward.

## 4-1. MAINTENANCE

**Note**: In this section, a number or a letter in parentheses will follow the first reference to each grinder part ( ). These numbers and letters are those used to identify the grinder parts and hardware items in the section view diagram.

### 4-2. LUBRICATION

**4-3. Motor Bearings.** The motor bearings are lubricated at the factory and will need to be re-lubricated after 12,000 hours of operation. See your motor maintenance manual for details.

**4-4. Gear Reducer.** The gear reducer is filled with grease at the factory and will require re-lubrication every 3-5 years. See your reducer maintenance manual for details.

**4-5. Cartridge Assembly.** The grinder top housing is half full of ACG-2 grease prior to shipment and is ready for operation. The top housing contains two gears that only need to be re-lubricated when the assembly is being repaired. You can re-lubricate the housing via the pressure release grease fitting (35). The pressure release grease fitting is pre-set at 10 psi. At pressures greater than 10 psi, the grease will be observed exiting the grease fitting via the bypass. This feature prevents over packing the bearings with grease and is available through Alamite.

The bottom bearing housing is sealed and gasketed and requires no lubrication.

| List of Lubricants (or Equivalents) | |
|---|---|
| Motor Bearings | See Mfg Recommendation |
| Gear Reducer | See Mfg Recommendation |
| Top Housing | ACG-2 (Dubois Chemical) |

### 4-6. DISASSEMBLY

Note: The following instructions cover grinder disassembly.

### 4-7. Disconnect Grinder

1. Flush the grinder (preferably with clean water) to remove all debris from the unit.

2. Shut off grinder.

3. Close suction and discharge valves.

4. Disconnect power source.

   **Caution: Electrical hazard…Be sure power is off and locked out.**

5. Drain any fluid in grinder.

**4-8. Cutter Cartridge Replacement**

Note: The following instructions cover the removal of the motor and gear reducer as an assembly to facilitate replacement of the grinding cartridge.

1. Secure the motor/reducer with a nylon sling and support with a hoist.

2. Remove cap screws connecting the reducer adapter (42) to the housing adapter (9). Remove the reducer adapter, reducer, and motor by lifting up with the hoist. Be careful not to allow the assembly to tip over.

3. Loosen the jaw coupling (43) set screw and remove the coupling half and key from the drive shaft (7).

4. Flanged Models….M12F2, M16F2, and, M18F2

   a. Remove the bolts and lock washers that connect the flange housings (41) to the inlet and outlet flanges of the pipe.
   b. Remove the cutter cartridge / flange housing assembly from the piping.
   c. Remove the cap screws and lock washers connecting the flange housings to the cutter cartridge. Remove the gaskets (40).

5. Remove and replace the cutter cartridge with a new or rebuilt cartridge from an Authorized Moyno Representative.

**4-9. Motor Removal**

The grinder may remain in line during motor removal and replacement.

Open and tag power disconnect in the control panel.

Disconnect and tag motor leads in the motor conduit box.

Remove the bolts connecting the motor (45) to the gear reducer (44). Some gentle prying may be necessary to remove the motor from the reducer.

Remove the key from the motor drive shaft.

**4-10. Gear Reducer Removal**

1. Remove the bolts connecting the gear reducer to the reducer adapter (42). Pry the gear reducer off the reducer adapter.

2. Loosen the jaw coupling (43) set screw and remove the coupling and key from the reducer shaft.

3. Remove cap screws connecting the reducer adapter (42) to the housing adapter (9). Remove the reducer adapter.

**4-11. Cartridge Disassembly**

1. Remove the socket head screws connecting the bottom cover (5) to the bottom housing (2) and remove the cover and gasket (3).

2. While holding the jaw coupling on the drive shaft, remove both castle nuts (16) and washers (15) from the drive and idler shafts.

3. Loosen the jaw coupling (43) set screw and remove the coupling and key from the drive shaft (7).

4. Remove the socket head screws connecting the housing adapter to the top housing (2). Remove the gasket (3) and clean grease from the top housing.

5. Remove the retaining rings (31) from both the drive shafts (7) and idler shaft (6).

6. Remove both gears (12, 13) and keys (30) from the shafts.

7. Remove the hex screws connecting the side rails (4) to the top and bottom housings. Remove both side rails and gaskets (37).

8. Remove the top housing. Clean any remaining grease from all cavities.

9. Remove the butt screws and washers holding the bearing / seal cartridge in the top housing. Gently press both cartridges out of their bores and remove the two spacers (32).

**10.** Remove the excluder plates (19), cutters (10), and spacer cutters (11) from both shafts. **Be careful removing the cutters and spacer cutters because they are very sharp.**

11. Pull both shafts from the bottom housing. Remove the excluder plates.

12. Remove the butt screws and washers holding the bearing / seal cartridge in the bottom housing and press the bearing / seal cartridges out of the housing.

13. Clean all parts in a suitable cleaning solvent being careful to observe all safety precautions regarding the use of solvent.

**4-12. Inspection**

1. Inspect all parts for wear and corrosion. Replace any parts that worn.

2. Replace all seals, bearings, O-rings, and gaskets.

**4-13. Assembly**

The Moyno Annihilator is generally reassembled in the reverse order of dismantling.

During the assembly process, cleanliness is important. To avoid premature failure, bearings, and seal components must be handled with care and kept clean.

**4-14. Bearing / Seal Cartridge Assembly**

The bearing / seal cartridge can be purchased from Moyno as a complete unit with no assembly required (See the parts list for part numbers). All the individual components that make-up the assembly can also be purchased. If components are purchased separately, follow the instruction below for assembly.

1. Carefully push the rotating portion of the mechanical seal (18), spring end first, onto the sleeve (17). Be careful not to damage the rubber bellows as you slide it over the step on the sleeve.

2. Place the stationary portion of the seal (19) on top of the rotating face. Place the O-ring (23) in the OD of the stationary seal portion.

3. Place the ball bearing (20) on top of the stationary and push the entire assembly down on the sleeve until the retaining ring groove can be seen.

4. Install the retaining ring (21) on the sleeve. Install the O-ring (24) in the ID of the sleeve.

5. Repeat this procedure until all four bearing / seal cartridges have been assembled.

**4-15. Cartridge Assembly**

1. Place the bottom housing (2) upside down on the work bench and gently push two bearing / seal cartridges (seal end first) into the bores. The ball bearing should be facing you.

2. Secure each cartridge with two butt screw and washers (38, 39).

3. Turn the bottom housing so that it rests on it's side. Place two excluder plates (14) into position on the top side of the housing.

4. Push the lower end of both the drive and idler shafts through the holes in the bearing / seal cartridge in the bottom housing. Be careful not to damage the mechanical seals.

5. Place the flat washer and castle nut on the end of each shaft. Tighten castle nuts approximately ¾ of the way, leaving them loose at this point. The castle nuts are the prevailing torque type and will have resistance the entire way up the thread. It will be necessary to hold the shafts while you install the nuts.

6. Turn the bottom housing / shaft assembly up on the bench. Align both shafts so that the point of the hex is facing toward you and perpendicular to the long edge of the bottom housing. It does not matter which side the drive or idler shaft is on; right or left.

7. Note that each cutter and spacer cutter has only 1 of the 5 cutting teeth radially in line with one point of the hex ID hole. This tooth is denoted as the Assembly Position (AP).

8. The hex shaft on your left is denoted Shaft 1, and the one on the right is Shaft 2.

9. Place a large (L) cutter on Shaft 1 with the AP positioned at Point 6 on the shaft (See figure 4-1.). Place a small (S) spacer cutter on Shaft 2 with the AP positioned at Point 3.

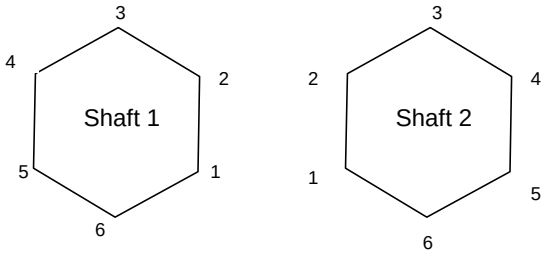


Figure 4-1

10. Place a small (S) spacer cutter on Shaft 1 with the AP positioned at Point 3, then place a large (L) cutter on Shaft 2 with the AP positioned at Point 6.

    Follow the pattern below until all cutters and spacer cutters have been installed.

    Cutters and spacer cutters are very sharp. Be careful handling them.

| Shaft 1 | Shaft 2 | |
|---|---|---|
| 6L | 3S | |
| 3S | 6L | |
| 1L | 4S | |
| 4S | 1L | |
| 2L | 5S | |
| 5S | 2L | |
| 3L | 6S | |
| 6S | 3L | |
| 4L | 1S | |
| 1S | 4L | |
| 5L | 2S | |
| 2S | 5L | |
| 6L | 3S | ← Repeat Starts |
| 3S | 6L | |

    Cutter and Spacer Stacking Arrangement
    L = Large Cutter
    S = Spacer Cutter

11. Place an excluder plate over the top of each shaft down on top of the last cutter and spacer cutter.

12. Place the top housing (2) upside down on the work bench and place the spacer (32) inside each bore. Gently push two bearing / seal cartridges (seal end first) into the bores. The ball bearing should be facing up towards you.

13. Secure each cartridge with two butt screw and washers (38, 39).

14. Gently lower the top housing down over the ends of each shaft being careful not to damage the mechanical seals.

15. Place a side rail gasket (37) against one side of the bottom housing and attached the side rail (4) with two cap screws and washers (28). Leave the screws loose at this point.

16. Slide another side rail gasket between the top housing and side rail at the top and secure with two more cap screws. Repeat this process on the other side and tighten all eight screws evenly.

17. Place a key (30) in the drive shaft and slide the small OD gear (13) down over the key. Install the retaining ring (31) in its groove above the gear.

18. Place a key (30) in the idler shaft and slide the large OD gear (12) down over the key. You may have to turn the shaft slightly to get the gear teeth to line up. Install the retaining ring (31) in its groove above the gear.

19. Carefully lay the unit down on its side. Before you completely tighten the two castle nuts in the bottom housing, it will be necessary to hold the drive shaft to prevent it from turning. You can either hold the shaft by temporarily mounting the coupling half (43) or by carefully wedging a small piece of soft metal between the teeth of the two gears. After you have secured the shafts, tighten both castle nuts.

20. Place the housing gasket (3) and bottom cover (5) against the bottom housing and secure them with six socket head cap screws (33).

21. Carefully turn the unit upright. With a hammer, tap the two spring dowels (8) into the two counter bored holes in the top housing.

22. Wipe a liberal amount of ACG-2 grease on and around each gear and fill the top housing approximately half full of grease.

23. Press the lip seal (25) into the housing adapter (9) with the spring side down.

24. Place the housing gasket (3) on the top housing and carefully slide the housing adapter over the drive shaft and down on the gasket. Secure the housing adapter with two socket head screws, two hex head screws and four washers. The two socket head screws go in the middle of the housing. The two hex head screw go in the two holes on the idler shaft side of the housing.

25. Install the grease fitting (26) in the housing adapter.

26. For Models….M12F2, M16F2, and M18F2

    1. Place the gasket (40) against one side of the cartridge body and place a flange housing (41) against the gasket. Secure the flange with the screws and washer (57). Place the gasket (52) and inspection plate (53) against the flange housing and secure with studs, washers, and nuts (54, 56)

    2. Repeat the above procedure on the other side with the second flange housing.

**4-16. Reducer / Motor Assembly**

1. Slide the key (29) and coupling half (43) down on the drive shaft and secure in place with the set screw. The root of the coupling teeth should be lined up with the end of the shaft.

2. Place the O-ring (46) in the groove in the housing adapter and place the drive adapter (42) on the housing adapter. Secure the drive adapter with four hex head screws and washers. The two longer screws thread into the top housing along the outside and the two shorter screws thread into the housing adapter.

3. Slide the key (29) and coupling half (43) on the reducer shaft and secure in place with the set screw.

4. Lower the gear reducer (44) onto the drive adapter carefully aligning the coupling halves. Align the holes in the flanges and install and tighten the six hex screws, washers and nuts (49).

5. Place the key in the reducer shaft and lower the motor (45) down onto the reducer while aligning the key and keyway. Attach the motor to the reducer with four hex screws and washers.

**4-17. TORQUE GUIDELINES CHART**

| Stainless Steel Bolts | | Carbon Steel Bolts | |
|---|---|---|---|
| **Size** | **Max Torque** | **Size** | **Max Torque** |
| NO. 10-24 | 22.8 in. lb. | 5/16 - 18 | 10 ft. lb. |
| 1/4 – 20 | 75.2 in. lb. | 3-/8 - 16 | 21.7 ft. lb |
| 5/16 – 18 | 132 in. lb. | ½ - 13 | 43.5 ft. lb. |
| 3/8 – 16 | 236 in. lb. | 5/8 – 11 | 86 ft. lb. |
| 1/2 – 13 | 517 in. lb. | ¾ - 10 | 152 ft. lb. |

Note: Torque values are from the Industrial Fasteners Institute and Craftsman Corp.

**4-18. STORAGE**

**4-19. Short-Term Storage.** Storage of 6 months or less will not damage the grinder. However, to ensure the best possible protection, the following is advised:

1. Store grinder inside whenever possible or cover with some type of protective covering. Do not allow moisture to collect around the unit.

2. See OPERATION Section before startup. Be sure all lubricants are in good condition.

**4-20. Long-Term Storage.** If grinder is to be stored for up to three years, perform the above short-term storage procedures plus the following:

1. Apply rust inhibitor to all unpainted cast iron and machined carbon steel surfaces.

2. Store in a dry area with dust cover.

3. Maximum temperature 120F, minimum temperature 30F.

4. Relative humidity should not exceed 60%. Provide desiccation for moisture control above the maximum.

5. Vibration levels should not exceed 2 mils at 60 hertz.

**4-21. Recommended Spare Parts**

Your Moyno Annihilator has been designed and built to minimize overall operating cost. All wearable parts are replaceable. A recommended inventory of spare parts is dependent upon the application and the importance of continued operation.

a. For minimal downtime, we recommend having a replacement cartridge in your inventory.

**4-22. PARTS LIST**

**Table 4-1. Parts List**

| REF. NO. | DESCRIPTION | *PART NUMBER* |
|---|---|---|
| 2 | TOP HOUSING | 4251417001 |
| 3 | HOUSING GASKET | 4230814001 |
| 4 | SIDE RAIL | SEE TABLE 2 |
| 5 | COVER PLATE | 4230813001 |
| 6 | IDLER SHAFT | SEE TABLE 3 |
| 7 | DRIVE SHAFT | SEE TABLE 4 |
| 8 | SPRING DOWEL | 6160100711 |
| 9 | HOUSING ADAPTER | 4251409001 |
| 10 | CUTTER | SEE TABLE 5 |
| 11 | SPACER CUTTER | 4230939001 |
| 12 | GEAR | 4230812001 |
| 13 | GEAR | 4230811001 |
| 14 | EXCLUDER PLATE | 4230805001 |
| 15 | WASHER | 6230070051 |
| 16 | CASTLE NUT | 6140320141 |
| 17 | SEAL SLEEVE | 4241488001 |
| 18 | SHAFT SEAL | 4220733001 |
| 19 | SEAL INSERT | 4230806001 |
| 20 | BALL BEARING | 6300502101 |
| 21 | RETAINING RING | 6011010196 |
| 23 | O-RING | 3207902152 |
| 24 | O-RING | 3207902133 |
| 25 | GREASE SEAL | 6030021002 |
| 26 | GREASE FITTING | 4220692001 |
| 30 | KEY | 4220735001 |
| 31 | RETAINING RING | 6011020175 |
| 32 | SPACER | 4220734001 |
| 37 | SIDE RAIL GASKET | 4230809001 |
| 40 | FLANGE HOUSING GASKET | SEE TABLE 6 |
| 41 | FLANGE HOUSING | SEE TABLE 6 |
| 42 | DRIVE ADAPTER | 4251753001 |
| 43 | COUPLING HALVES | 4241654001<br>4241655001 |
| 44 | REDUCER | SEE NAME PLATE |
| 45 | MOTOR | SEE NAME PLATE |
| 46 | O-RING | 3207902269 |
| 52 | INSPECTION PLATE GASKET | SEE TABLE 6 |
| 53 | INSPECTION PLATE | SEE TABLE 6 |

Note A: Bearing / Seal Cartridge includes items 17, 18, 19, 20, 21, and 23.
Note B: See Table 7 for gasket kits.

**Table 2 (Ref. No. 4) — Side Rail**

| Model | Part Number |
|---|---|
| M18C2 | 4251412001 |
| M24C2 | 4251413001 |
| M32C2 | 4251414001 |
| M12F2, M16F2, M18F2 | 4251416001 |

**Table 3 (Ref. No. 6) — Idler Shaft**

| Model | Part Number |
|---|---|
| M18C2 | 4251418001 |
| M24C2, M12F2, M16F2, M18F2 | 4251420001 |
| M32C2 | 4251422001 |

**Table 4 (Ref. No. 7) — Drive Shaft**

| Model | Part Number |
|---|---|
| M18C2 | 4251419001 |
| M24C2, M12F2, M16F2, M18F2 | 4251421001 |
| M32C2 | 4251423001 |

**Table 5 (Ref. No. 10) — Cutter**

| Style | Part Number |
|---|---|
| 7R, 7 Tooth Reversible | 4230807001 |
| 11C, 11 Tooth Cam | 4230911001 |

## Table 6 — Flange Housing Arrangement

| Model | Ref. No. 41 Flange Housing | Ref. No. 40 Flange Housing Gasket | Ref. No. 53 Inspection Plate | Ref. No. 52 Inspection Plate Gasket |
|---|---|---|---|---|
| 12F | 4251783001 | 4241489001 | 4230908001 | 4230909001 |
| 16F | 4251399001 | 4241489001 | 4230803001 | 4230804001 |
| 18F | 4251893001 | 4241489001 | 4230803001 | 4230804001 |

## Table 7 — Gasket Kits

| Model | Part Number |
|---|---|
| All Channel models | KCHA40Q |
| M12F2 | K12F20Q |
| M16F2/M18F2 | K16F20Q |

Note C: Channel model gasket kits include items 3 and 37.
Note D: Flanged model gasket kits include items 3, 37, 40, and 52.

**Note E: Model M18C requires 38 cutters and 38 spacer cutters.**
**Models M24C, M12F, M16F and M18F require 52 cutters and 52 spacer cutters.**
**Model M32C requires 70 cutters and 70 spacer cutters.**

**Note F: Pre-assembled replacement cutter cartridges are available. Consult your local Moyno Representative for details.**

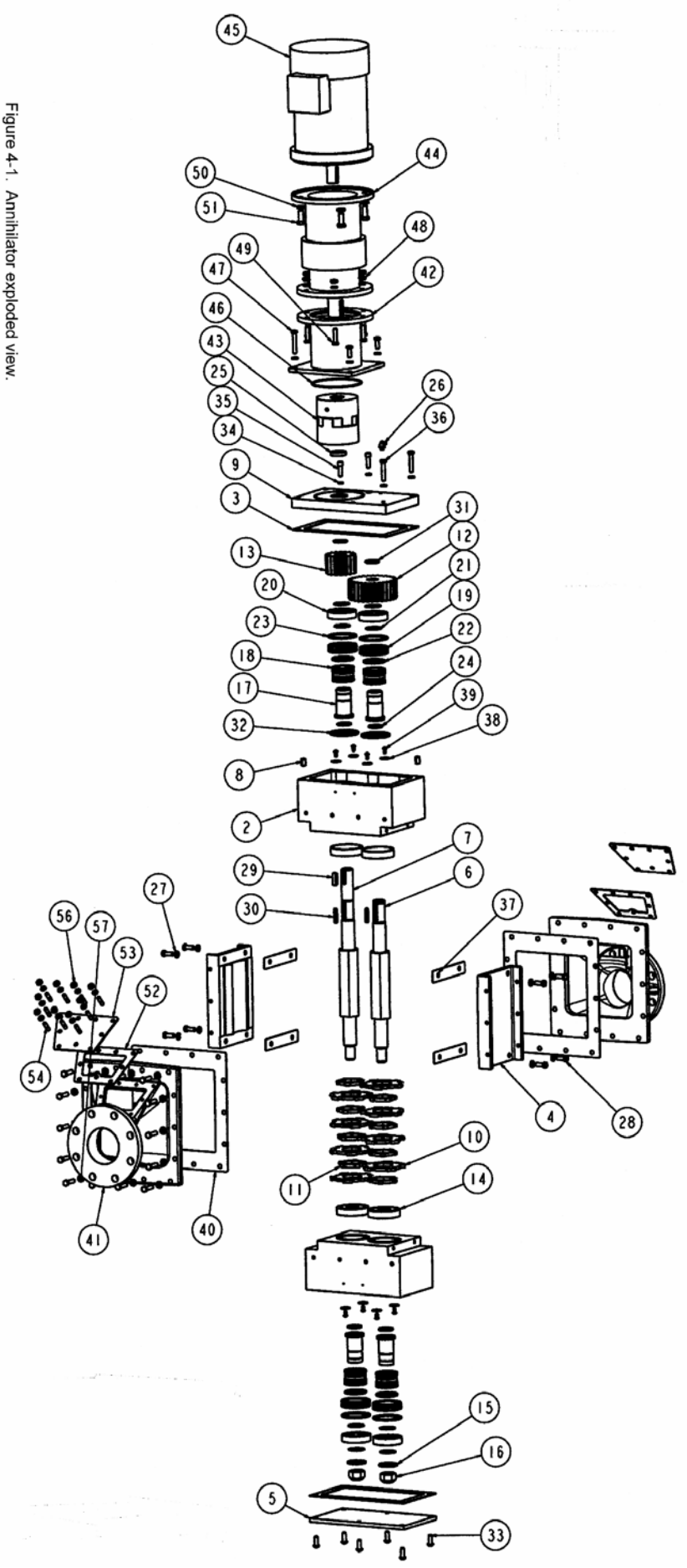


Figure 4-1. Annihilator exploded view.

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